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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/118,945	07/17/1998	JAMES T. HURLEY	042390.P4661	9535

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EXAMINER
GOOD JOHNSON, MOTILEWA

ART UNIT	PAPER NUMBER
2672	22

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/118,945	HURLEY ET AL.	
	Examiner	Art Unit	
	Motilewa A. Good-Johnson	2672	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 March 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. This action is responsive to communications: application, filed on 07/17/1998; IDS paper #3, filed on 07/17/1998; IDS, paper #8, filed on 11/13/2000; Amendment A, filed on 11/13/2000; Preliminary Amendment B, filed 07/23/2001; Amendment C, filed 03/24/2003.

2. Claims 1-21 are pending in the case. Claims 1, 7, 12, 15 and 21 are independent claims. Claims 1, 7, 12, and 15 have been amended. Claim 21 has been added.

3. The present title of the application is "Extension of Fast Phong Shading Technique for Bump Mapping" (as originally filed).

Continued Examination Under 37 CFR 1.114

4. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/24/2003 has been entered.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

6. Claims 1-21 are rejected under 35 U.S.C. 102(a) as being anticipated by Miller et al., *On-the-Fly Texture Computation for Real-Time Surface Shading*, IEEE, 1998, pages 44-58.

As per independent claim 1, . . . a method for implementing bump mapping, comprising the steps of: generating a table of color values . . . ; (Miller discloses precomputed shading information tables, page 45, col. 1) estimating angle coordinates for a pixel in a polygon; (Miller discloses calculating angles for the normal vector, page 47, col. 1) modifying the estimated angle coordinates . . . ; (Miller discloses displacement of the object using the objects scaling, page 49, col. 1) converting the modified angle coordinates . . . ; (Miller discloses transforming the bump mapped surface, page 49, col. 2) and assigning the pixel a color value according to the one or more color variables. (Miller discloses converting a color image to an indexed color image using color quantization, computing a table whose row coordinate is the color index and column coordinate is a scaling value, page 47, col. 2)

With respect to dependent claim 2, . . . generating angle perturbations; and adding the angle perturbations to the angle coordinates. (Miller discloses normal vector

angles scaled by a range of constants, which results in a table of a constant scaling factor and angles, page 47, col. 1)

With respect to dependent claim 3, . . . estimating a bump variable for the pixel; and converting the bump variable to angle perturbations. (Miller discloses bump-mapping computations to deflect the surface normal before shading, page 49, col. 1, and further discloses scaling angles of the normal vector, page 47, col. 1)

With respect to dependent claim 4, . . . converting the perturbation variable comprises retrieving angle perturbations from a bump map location . . . (Miller discloses avoiding the recomputing of deflected normal by precomputing and caching them and using a table to look up the values, page 49, col. 2)

With respect to dependent claim 5, . . . determining angle coordinates for normal vector orientations at vertices . . . ; interpolating angle coordinates for the pixel from the determined angle coordinates. (Miller discloses doing work at each vertex and then interpolate values to compute the pixel color, page 50, col. 2)

With respect to dependent claim 6, . . . determining perturbation variables for the vertices of the polygon; interpolating perturbation variables for the pixel from the determined vertex perturbation variables. (Miller discloses computing bump mapped normals and interpolating the light vector from the normal, page 51, col. 1)

As per independent claim 7, . . . a graphics system comprising: a geometry engine . . . ; (Miller discloses using standard rendering engines, page 45, col. 1) a color map including color values for a sample of vector orientations . . . ; (Miller discloses precomputed shading information table and amortizing the table creation, page 45, col.

1) a perturbation source to provide orientation perturbations; (Miller discloses computing entries in the table based on a sampled set of normal directions, page 45, col. 1) and a rendering engine to convert vertex data for each polygon to angle and perturbation coordinates . . . (Miller discloses rendering hardware, page 55, col. 1)

With respect to dependent claim 8, . . . the orientation-dependent color variables are linearly related to angle coordinates . . . (Miller discloses computing the lighting table using spherical polar parameterization, page 47, col. 1)

With respect to dependent claim 9, . . . the perturbation source is a bump map including angle perturbations . . . (Miller discloses bump mapping to deflect the surface normal before shading, page 49, col. 1)

With respect to dependent claim 10, . . . rendering engine includes a generator that combines the angle coordinates and angle perturbations into perturbed color coordinates. (Miller discloses a converted color texture image to an indexed color image by computing a table indexed by a scaling value and color index value, page 47, col. 2)

With respect to dependent claim 11, . . . the perturbation source is an algorithm for associating perturbations with polygon locations . . . (Miller discloses an algorithm for computing bump map computation, page 49, col. 1)

As per independent claim 12, . . . a machine-readable medium . . . , it is rejected based upon similar rational as above independent claim 1.

With respect to dependent claim 13, . . . generating angle perturbation for the pixel; and combining the angle perturbations with the angle coordinates to form modified

angle coordinates. (Miller discloses displacements that scale linearly with the object, page 49, col. 1)

With respect to dependent claim 14, . . . interpolating angle coordinates for the pixel from angle coordinates for the polygon vertices; and converting the interpolated angle coordinates to scaled angle coordinates. (Miller discloses transforming the surface tangents and normals and interpolating values to compute the pixel color at each vertex, page 50, col. 2)

As per independent claim 15, it is rejected based upon similar rational as above independent claim 7.

With respect to dependent claims 16 and 17 respectively, see above rejection for dependent claims 9 and 10.

As per independent claim 18, a system comprising, it is rejected based upon similar rational as above independent claim 1.

With respect to dependent claim 19, . . . each color value is associated with first and second angle coordinates . . . (Miller discloses the precomputed values in the look up table correspond to an array of spherical-polar indices, page 49, col. 2)

With respect to dependent claim 20, . . . graphics pipeline includes texture-mapping hardware and the color values are accessed using the texture mapping hardware. (Miller discloses using hardware that implements texture mapping, page 45, col. 1)

As per independent claim 21, a computer implemented method comprising: generating a plurality of color values for a sample of vector orientations based on

properties of a polygon that includes a pixel; (Miller discloses precomputed shading tables indexed by surface normal based on a sampled set of normal directions, page 45, col. 1, and further discloses the spherical polar parameterization, page 47, col. 1) determining a pair of angle coordinates for the pixel from a set of one or more vertex normals of the polygon; interpolating the pair of angle coordinates; (Miller discloses determining the spherical polar angles and storing the lighting table samples indexed in terms of the spherical polar angles, page 47, col. 1, and interpolation for transformation of the light values, page 49, col. 1) modifying the interpolated pair of angle coordinates with a perturbation value; (Miller discloses bump mapping computation, page 49, col. 1) determining a color variable with the modified interpolated pair . . . ; assigning at least one of the plurality of color values to the pixel in accordance with the color variable. (Miller discloses converting a color image to an indexed color image using color quantization, computing a table whose row coordinate is the color index and column coordinate is a scaling value, page 47, col. 2)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Motilewa A. Good-Johnson whose telephone number is (703) 305-3939. The examiner can normally be reached on Monday - Friday 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Razavi can be reached on (703) 305-4713. The fax phone numbers

for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and (703) 872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

Motilewa Good-Johnson

Motilewa A. Good-Johnson
Examiner
Art Unit 2672

mgj
May 27, 2003